



TESTING the bore of an ejection catapult trunnion for a surface finish requirement of 32 micro-inches, in the inspection department of Canadian Flight Equipment Cobourg Ltd. Using the electronic Talysurf machine is inspector Arthur Guthrie.

Accent on Crew Survival

Quality products trigger safe ejections

By Peter Brannan

Versatility is the first requisite for survival in the aviation business. No one realizes this better than Bob Murison, founder and manager of Canadian Flight Equipment Ltd., of Cobourg, Ontario.

This is the firm which for a number of years built the famous Martin Baker ejection seat in Canada, under license from the British company. Something over 1,000 of these were produced for the CF-100 by the Cobourg firm.

In 1956 came the chop. Martin Baker moved across from Britain to set up their own plant at Collingwood, Ontario. Murison had to look around for some other source of work to keep his plant in operation.

How well he succeeded was proved recently when he was awarded a \$750,000 contract for aircraft components by the RCAF. Between these two major events in the firm's chronicles there lies the real story: Murison's long uphill fight to keep going.

When pickings were lean in the

aviation end of its business, Canadian Flight Equipment turned out quite a motley collection of articles, from rifle slings for the army, to babies' carry-cots. But whatever the firm and its associated manufacturing company, Campbellford Precision Products, produced, it was given a quality label.

"Quality, and delivery on time" are the watchwords Murison quotes as the ruling policy of the firm.

The rifle sling contract kept the sewing shop, which formerly produced the parachutes for ejection seats, ticking over. Result was that when Avro needed nylon canopies for the ground protection of the cockpit cover and fuselage of the CF-105, Canadian Flight Equipment were able to do the job.

Stake in the Arrow

Like most of the other items made by the firm for the Arrow, the canopy cover was produced on a purely token order basis. But when the machine goes into production, as has been assured, the Cobourg firm expects to have a stake in it.

The firm produced certain details for the Arrow prototype, but one of Murison's hopes is that eventually he might be able to get a contract for the ejection seats in the aircraft. Then his operations will have turned the full circle. But this is peeking ahead in the story.

When he ceased production of the Martin Baker seat, Murison investigated the ancillary items which go to make up the ejection units in RCAF aircraft. He found that the cartridge actuating devices used to operate the ejection seats in the RCAF's F-86's and T-33's were being produced in the States. They were supplied by the U. S. Government. This looked like an opportunity to make a Canadian contribution to RCAF equipment.

With the blessing of the Canadian Department of Defense Production and the U. S. Government, Murison obtained drawings of the cartridge actuating devices and was given permission to produce them in Canada. His chief engineer was given facilities to discuss American production of the items, and then came back and set to work to plan Canadian tooling and production methods.

In the meantime Canadair was having difficulty in obtaining delivery on time of the articles from the U. S. for the West German order for Sabre 6's. D.D.P. brought Canadair and Murison together and Murison persuaded Canadair to give him a chance to meet their needs for the cartridge actuated devices by making them in Canada. The contract was for \$150,000.

Utmost precision was essential on

Scratch on a catapult case can mean failure

this job. Obviously every part of an aircraft is vital in that it will affect the over-all operation. But these components are at the heart of crew survival. When the pilot or navigator pulls the firing handle, that cartridge just has to go. There's no time to draw a replacement from the stores!

Probably the finest vote of confidence which could be given to Canadian Flight Equipment was the three-quarter million dollar RCAF contract already mentioned. This is presently being carried out and is in connection with the retrofit crew escape equipment program for the T-33 Silver Star jet trainer.

The items ordered include the M5 catapult, a three-tube telescoping device, used on the ejection seats of both the T-33 and the F-86. This contains an explosive charge which when detonated extends the tubes, taking the seat with it.

To avoid the necessity for any linkage or other mechanical device, which might be subject to failure through damage, the catapult is fired by the M3 initiator. This incorporates a small explosive charge which is fired by the operation of a trigger located on the seat. The explosion sets up pressure in a tube running from the initiator to the firing pin mechanism of the main explosive charge of the catapult.

Another device ordered for the T-33 is the M5A1 Thruster. This employs an explosive charge to unlock the canopy of the airplane before ejection. The canopy is then removed by a remover. These items are also operated by the M3 Initiator.

Care initiated at the critical design stage of these items is carried through in the machine shop at Campbellford Precision Products and assembly shop at Canadian Flight Equipment. Even a scratch on the casing of the telescoping tubes of the catapult can cause failure. 100 percent inspection is mandatory and rejection for minor deviations in parts is rigidly maintained.

This need for accuracy and top quality is the reason for the very well equipped test and inspection department at Campbellford and Cobourg. From the outside you maybe wouldn't give the Campbellford plant a second look. It is an old converted mill the appearance of which belies the expensive equipment within its tidy interior.

This is in line with Murison's philosophy. "We don't go in much for show," he said. "We are more concerned with the quality of the product and have filled our workshop and inspection department with only first-

class machinery and equipment."

For measuring the fine surface finishes involved in the production of the catapult and other cartridge actuated devices, a Talysurf is used. This analyzes machined surfaces electronically, indicating any variation in the surface finish. Arthur Guthrie, one of the inspectors, picked up a part which was in for inspection to demonstrate the machine to me.

Permissible tolerance for the part was 63 micro inches. As the diamond tip of the testing finger moved along its surface the story was told on an accompanying gauge. Maximum deviation was under 10 micro inches, well within prescribed limits.

The inspection department has at its disposal Rockwell, Brinell and Vickers hardness testing machines, a tensile testing machine with power applied load and variable speed, an optical projector, and a complete range of standard precision measuring equipment.

Modern machinery is also in use in the machine shop and in the tool room, where the firm produces its own fixtures and jigs. Throughout the plant ingenious use has been made of Dexion angle, to support benches, racks, and machinery.

After production of the component parts at Campbellford, these are carefully packed in individual compartments in custom-designed wooden trays. They are then transported by road to Cobourg where all assembly is carried out. All explosives are also stored at Cobourg, in accord with stringent safety regulations, so that when the finished product leaves the plant it is ready for the aircraft.

Test Fire Program

A surprisingly high proportion of these expensive parts never see service. Ten out of every batch of catapults, initiators and thrusters are selected at random and test fired in the U. S. This ensures that the production items meet the specified requirements across the temperature range of —65 to 160 deg. F. Failure of any one test item means rejection of the production batch.

This is in addition to the strict inspection and functional procedures all the way along the line. If I were an RCAF pilot I would find this comforting. Even as a taxpayer I don't begrudge the expenditure entailed.

Canadian Flight Equipment are certainly back in the business with both feet. They are making progress despite the cutbacks and other obstacles being met by most firms in



FOUNDER. R. A. J. (Bob) Murison, founder and general manager of Canadian Flight Equipment. His watchwords: "Quality and Delivery on Time."

the industry. But I got the impression that Murison is only biding his time. He wants to get back into the ejection seat business.

With this aim in view he struck up an informal association with the Stanley Aviation Corp., amongst other things a leading U. S. ejection seat manufacturer. This firm has vast experience in crew escape systems, particularly for supersonic aircraft. It is producing upward and downward ejection systems for many operational U. S. aircraft, including the B-52 and the F-104A. Research is also being conducted by the firm in the field of capsule ejection.

Canadian Flight Equipment has gained in engineering experience from the liaison. With the design and technical backing of the U. S. firm, it has produced one ejection seat for the mock-up of the Canadair CL-41 jet trainer. Now that Canadair have declared their intention of going ahead with the project, Canadian Flight Equipment have hopes of getting back into the ejection business earlier than they expected.

Concentration upon quality has certainly paid off for Bob Murison. He believes in employing experienced people with sound engineering training, and all employees participate in his collective bonus scheme. Chief of his inspection department was formerly an inspector with Rolls Royce in Britain. Many of his employees have served apprenticeships with reputable aviation firms in Britain and other countries.

Here is a firm largely composed of New Canadians which is making a creditable contribution to the country's growth.